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A Nurse's Guide for Teaching Patients Undergoing Cancer Chemotherapy

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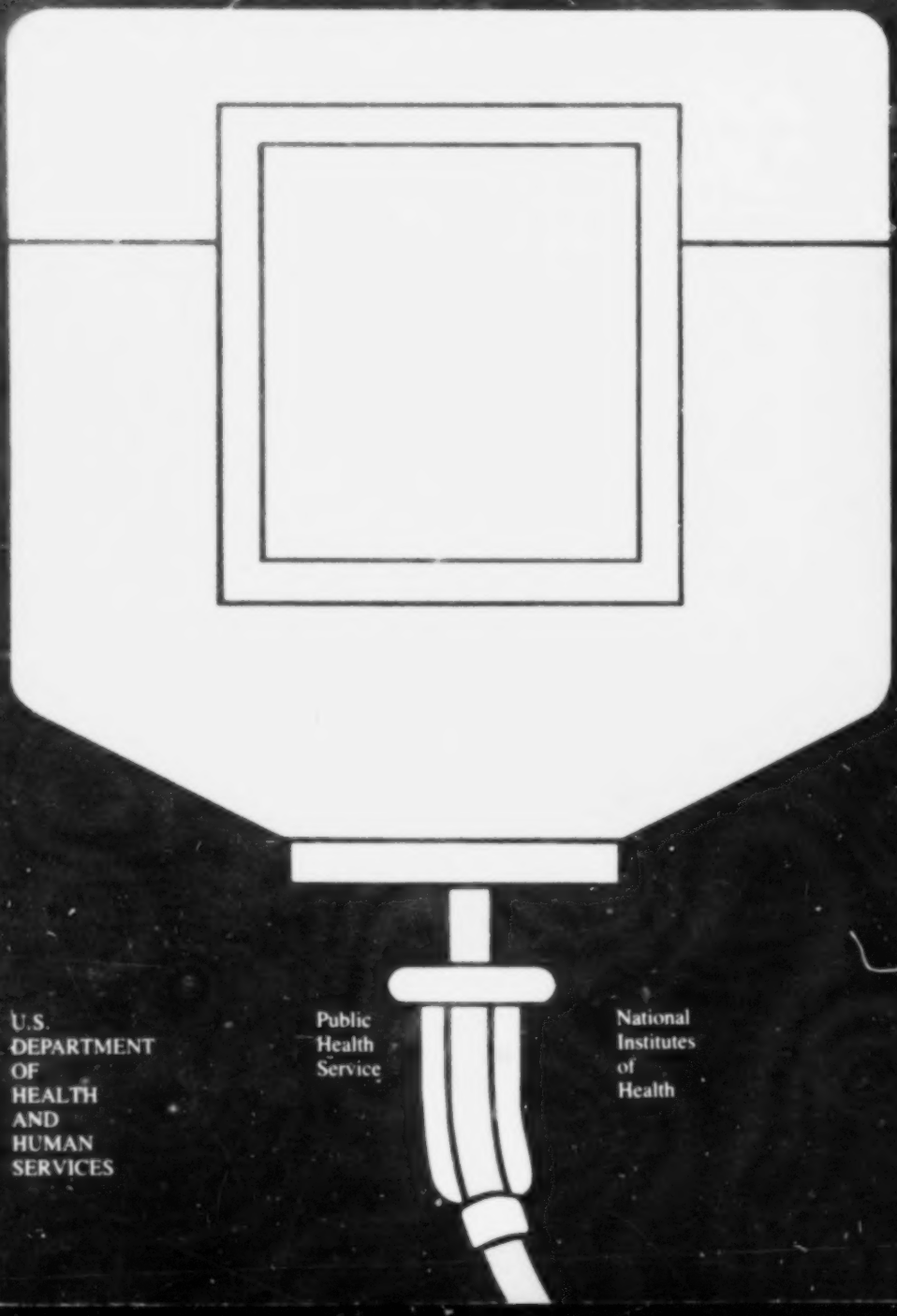

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Preface

This monograph is written to provide professional nurses with the essential information to teach a patient/family about cancer chemotherapy. An educational approach is necessary if the patient is to achieve and maintain an optimum level of wellness before, during and after chemotherapy.

The original "A Nurse's Guide To Cancer Chemotherapy For Use In Patient Teaching" was developed in 1977. The need for a more comprehensive guide was identified as the professional nurses of the Cancer Nursing Service assumed responsibility for patient/family teaching in both the in-hospital and out-patient setting. A review of the literature indicated that available teaching material pertaining to chemotherapeutic agents was inappropriate for our patient population. As clinical nurse experts, we acknowledged the need to develop a teaching guide which would provide the knowledge base for accurate and consistent teaching.

Through a collaborative arrangement between the Nursing and Pharmacy Departments of the Clinical Center, clinical pharmacists have made a major contribution to the monograph content. Professional nurses, who care for oncology patients, have had the opportunity to pre-test and evaluate this material. They have suggested revisions in pre-existing material and the incorporation of nursing care plans.

"A Nurse's Guide for Teaching Patients Undergoing Cancer Chemotherapy" is designed as a concise, yet comprehensive reference, to promote excellence in oncological nursing practice.

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A Nurses's Guide for Teaching Patients Undergoing Cancer Chemotheraphy

Purpose

To provide the professional nurse with instructional material to use in teaching the patient/significant other about chemotherapeutic agents, potential side effects, and prevention of complications.

Process

The principles of teaching and learning are used as the basis for teaching strategies. The nurse-teacher should be familiar with these principles and apply them to facilitate the learning process. This process consists of four components: assessment, planning, implementation and evaluation. The nurse incorporates these components into a teaching program designed to meet the patient's individual needs and to involve the patient in the learning process.

Effective, individualized teaching depends upon *assessment* of the patient's learning needs. The nurse-teacher *assesses* the patient's readiness, motivation, knowledge level, life-style, and previous experience with chemotherapy. In *planning* the learning experience, specific educational objectives are developed to meet the patient's needs. These objectives reflect the goals which the nurse and patient hope to accomplish together. In *implementing* the teaching sessions, the format and number vary according to individual learning requirements and abilities. During the teaching sessions, the nurse-teacher:

- provides the essential information
- reinforces what the patient already knows and corrects misinformation
- provides the opportunity for asking questions and
- offers reassurance and emotional support.

In *evaluating* the teaching-learning process, patient behavioral outcomes are compared with stated objectives. This continuous reassessment enables the nurse to judge the effectiveness of the program and make appropriate readjustments.

Nursing Objectives

- To involve patient/significant other in a personalized medical/nursing plan of care.
- To prepare the patient in the most effective manner (cognitively and emotionally) for receiving chemotherapy.
- To enable the patient/significant other to learn the name/s of current chemotherapeutic agent/s and their side effects.
- To enable the patient/significant other to recognize possible side effects.
- To enable the patient/significant other to identify reportable symptomatology (e.g. infection/bleeding).
- To instruct the patient/significant other in prophylactic measures which prevent acute/delayed toxicities.
- To enable the patient/significant other to initiate appropriate action when toxicities occur.
- To enable patient/significant other to develop a plan for home care.

Teaching Action	Learning Action
Provide comfortable, quiet and private area for teaching sessions. During each session, allow adequate time to instruct patient/significant other and permit questions. Permit patient to verbalize feelings about disease.	Patient/significant other is receptive to teaching sessions. Patient is able to verbalize feelings about disease.
Use vocabulary appropriate to patient/significant other's level of understanding.	Patient/significant other is able to restate informational content in own words.
Explain briefly to patient/significant other the purpose and importance of preparation (e.g. hydration) for specific chemotherapeutic agent/s.	Patient will verbalize importance of preparation for chemotherapy (e.g., adequate hydration).
Describe briefly the possible side effects of the chemotherapeutic agent/s. Ask the patient/significant other if there are any questions.	Patient/significant other should be able to state in own words possible side effects of the chemotherapeutic agent/s.
Describe briefly to patient/significant other changes in the patient's health status which should be reported to the professional nurse or physician.	Patient/significant other in own words states changes in the patient's health status which should be reported to the professional nurse or physician.
Describe briefly to the patient/significant other prophylactic measures which prevent acute/delayed toxicities.	Patient/significant other in own words states the prophylactic measures which will prevent acute/delayed toxicities.

Describe briefly the appropriate actions which should be undertaken when acute/delayed toxicities occur.	Patient/significant other in own words verbalizes the appropriate actions which should be taken when acute/delayed toxicities occur.
Assist patient/significant other to develop a plan for home care.	Patient/significant other in own words is able to describe a plan for home care.
Provide patient/significant other patient information material which can be used for future reference.	Patient/significant other has material for future reference.
Evaluate effectiveness of teaching program at periodic intervals. Provide re-enforcement of teaching as need is identified.	Patient/significant other expresses inadequate understanding, insufficient knowledge or changing needs which are met with future teaching.

Nursing Measures to Maintain Hydration and Nutrition

Patient Problem
Anorexia, nausea and vomiting; if these symptoms are unrelieved, may progress to electrolyte imbalance and dehydration.

Expected Outcome
Patient will maintain adequate hydration and nutritional status.

Nursing Actions
1. Suggest use of antiemetics to reduce nausea and vomiting.
   - Inform patient that antiemetics should be used prophylactically.
   - Inform patient that antiemetics are frequently effective when administered on a schedule (e.g. every four hours) in conjunction with chemotherapeutic agents known to produce major nausea and vomiting.
   - Instruct patient to report vomiting which is persistent or unrelieved by antiemetics to nurse or physician.
   - Suggest alternate methods to reduce nausea associated with unpleasant taste (gum, candy).
2. Suggest methods to reduce anorexia and maintain nutritional status.
   - Include dietary history in initial patient assessment and initiate appropriate teaching program.
   - Initiate consultation with dietitian, if indicated.
   - Suggest frequent oral cleansing, especially before meals and feedings.
   - Suggest small, frequent feedings at intervals appropriate to patient's needs and desires.
   - Stress importance of maintaining well-balanced food intake for patients receiving extended therapy. Encourage patient to maintain high carbohydrate, high protein diet between chemotherapy cycles.
   - Monitor nutritional status by obtaining body weights at regular intervals.
   - Inform patient that certain drugs may alter taste sensations; usual food preferences may be affected (proteins, sweets). This varies with the individual.

3. Stress importance of maintaining hydration in conjunction with chemotherapy.
   - Inform patient that before receiving some agents, it is necessary to begin a high fluid intake twelve to twenty-four hours in advance to ensure that urine output will be adequate. The amount varies with patient's body surface area: 2000-4000 ml per 24 hours or 8-12 glasses/20 ounce glasses.
   - Instruct patient in necessity for maintaining a high fluid intake during and after chemotherapy with particular agents (e.g. Cytoxan and Cis-platin).
4. Inform the patient that the chemotherapy schedule may be adjusted to an individual's needs, (e.g. administered later in the day, after work or school).
5. Provide any instructional materials available.

Nursing Measures to Reduce Susceptibility to Infection

Patient Problem
Bone marrow depression and depressed immune response system secondary to chemotherapy.

Expected Outcome
Patient will maintain maximum state of wellness.

Nursing Actions
1. Inform patient that although infection is the major cause of morbidity in cancer patients, preventive measures can reduce the incidence for individual patients.
2. Instruct patient in rationale for monitoring blood counts.
   - Assess patient's knowledge/understanding of white blood cell function.
   - Inform patient that bone marrow depression is temporary and that normal function will return.
3. Inform patient that depressed immune response system is secondary to both neoplasm and therapy. Assure patient that normal immune response will return when disease is in remission and therapy is completed.
4. Inform patient of methods to prevent infection.
   - Practice meticulous oral and body hygiene.
   - Maintain adequate nutrition/hydration.
   - Reduce exposure to infection. (Avoid individuals with existing infection.)
5. Instruct patient to report any signs and symptoms of possible illness to nurse/physician.
   - Generalized infection: fever, chills, malaise.
   - Localized infection: redness, swelling, tenderness.
6. Instruct patient in means of detecting fever and inform patient of specific temperature which should be reported to physician or nurse, (e.g. temperature of 38° or above).
   - Assess if patient is able to use and read a thermometer correctly. Instruct patient in temperature procedure and/or thermometer reading if necessary.
   - Ascertain if patient has a thermometer. Assist patient in obtaining instrument if necessary.
   - Instruct patient of necessity to monitor and record temperature at periodic regular intervals subsequent to initial elevation, (e.g. every four hours while awake).

Nursing Intervention for Patients Susceptible to Bleeding and Anemia

Patient Problem
Bone marrow depression secondary to chemotherapy, specifically thrombocytopenia and anemia.

Expected Outcome
Patient will be able to initiate measures to prevent and/or control bleeding. Patient will recognize manifestations of anemia and seek professional intervention as necessary for anemia and/or bleeding.

Nursing Actions

1. Inform patient that thrombocytopenia (low platelet count) and anemia (low hemoglobin) are anticipated major side effects for patients receiving chemotherapy.
2. Instruct patient in rationale for monitoring blood counts.
   - Assess patient's knowledge of platelet and red cell function.
   - Inform patient that bone marrow depression is temporary and that normal function will return.
3. Instruct patient in methods to prevent bleeding.
   - Avoid participation in activities which predispose to trauma or injury.
   - Take bleeding precautions to avoid traumatizing susceptible body tissues, (e.g., shave with an electric razor). Suggest use of Toothettes®.
   - Avoid the use of aspirin in any form.
4. Instruct patient in methods to control bleeding.
   - Apply continued pressure to bleeding site for 3-5 minutes. Repeat for 5-10 minutes if necessary.
   - If bleeding remains uncontrolled, instruct patient to notify physician or nurse.
5. Instruct patient in methods to reduce symptoms of anemia: lassitude, fatigue, paleness. Instruct patient to report postural hypotension, shortness of breath, easy fatigability to physician or nurse.
6. Instruct patient in rationale for therapeutic measures for bleeding and anemia, (e.g. platelet and packed red cell transfusions).

Nursing Intervention for Patients Susceptible to Alopecia

Patient Problem
Alopecia, a distressing side effect, brings about an alteration in body image. This additional concern increases the patient's anxiety.

Expected Outcome
Patient will be informed of the possibility of hair loss and will utilize resources to reduce stress produced by an alteration in body image.

Nursing Actions

1. Inform patient that hair loss is an expected side effect of certain agents. Suggest the use of hairpiece, wig, hat or scarf.
2. Inform patient that a hairpiece/wig is available through National Cancer Institute funds. The request for a hairpiece must be initiated by the patient's primary physician or nurse.

3. Instruct the patient to coordinate the arrangements for the prosthesis (wig/hairpiece) with the social worker. Inform the patient that the nurse will assist with coordination.
4. Provide emotional support and counseling for the patient with altered body image. Initiate appropriate referrals to resource individuals.
5. Reassure patient that hair will grow back when chemotherapy is discontinued. Inform patient that occasionally hair begins to grow back during therapy.
6. Inform patient that new hair may be of different color and texture.

Nursing Intervention in Response to Extravasation of Specific Vesicant Drugs

Patient Problem
Local inflammation, pain, and tissue damage occur when these specific antineoplastic agents (Adriamycin, Daunomycin, Vincristine, Velban, Actinomycin-D, and Mitomycin-C) extravasate into the tissue surrounding the intravenous site. Extensive tissue loss may result with irreversible damage to underlying tendons and neurovascular structures with functional joint impairment.(1)

Expected Outcome
Tissue damage will be prevented as a result of appropriate nursing intervention.

Nursing Actions
1. Recognize and/or suspect extravasation of specific vesicant drug (Adriamycin, Daunomycin, Vincristine, Velban, Actinomycin-D and Mitomycin-C) when:
   - patient complains of pain and/or burning at injection site,
   - a venous blood return is not obtained through aspiration of the intravenous tubing,
   - erythema or swelling occurs at the intravenous site.
2. Remove the intravenous needle immediately and apply ice pack to the site.
3. Inform the patient's primary physician immediately and initiate therapy. (Note: standardized orders outlining appropriate nursing measures have been developed. Since these standardized orders are available, the professional nurse should request the physician to sign the orders before chemotherapy is administered. Standardized order sheets will be incorporated into the patient's chart.)
4. Initiate appropriate treatment measures according to physician's order and/or standardized order sheet:
   - Anesthetize the skin surface with Ethyl Chloride
   - Inject Hydrocortisone Sodium Succinate (Solu-Cortef Mix-O-Vial) 100 mg/vial) intradermally and subcutaneously into the site, using 25-gauge straight needle. Multiple injections are administered from the periphery inward and toward the entire erythematous area and along the borders of the infiltrate. The dose of Solu-Cortef is from 50 to 200 mgm

depending on the size of the infiltrate and the area of erythema.

- Apply a film of 1% hydrocortisone cream to the area and cover with a sterile 4x4 gauze pad secured with paper tape.
- Apply an ice pack to the area and instruct the patient to keep ice on as continuously as possible for 24 hours, (at least 50 minutes of every hour).
- Instruct the patient to apply steroid cream twice daily or more frequently if skin tension in the area occurs until all the redness has disappeared.
- Instruct the patient to exercise the affected extremity and not allow pain to restrict full range of motion.(2)
- Document the incident fully in the patient's chart.

5. Observe the extravasation site carefully and document status on a daily basis. If patient is at home, assess condition by telephone when possible.
6. Instruct patient in care of extravasation site (use of hydrocortisone cream, ice). Supply patient with hydrocortisone cream, gauze, and paper tape. Write instructions for patient and check with patient on a daily basis (for seven days).
7. Instruct patient to report any prolonged pain or redness to physician or nurse.
8. Provide emotional support while extravasation site heals.
9. Utilize professional nurses certified to administer intravenous chemotherapy for professional consultation.
10. Assess area of extravasation on next patient visit and document observations in patient's record.

References:

1. Reilly, J.J. and others. Clinical course and management of accidental adriamycin extravasation. *Cancer 40:* 2053-2056, Nov. 1977.
2. Barlock, A.L., Howser, D.M. and Hubbard, S.M. Nursing management of adriamycin extravasation. *American Journal of Nursing* 79: 94-96, January 1979.

Nursing Intervention to Maintain Good Oral Hygiene

Patient Problem

Chemotherapy alters the integrity of the oral mucosa and diminishes the host response to oral flora, predisposing the patient to periodontal disease.

Expected Outcome

Patient will be able to initiate measures to prevent and/or minimize periodontal disease.

Nursing Actions

1. Inform the patient that:
   - Chemotherapy alters the structure and the integrity of the oral mucosa, predisposing patients to bleeding and infection.
   - Periodontal disease in healthy individuals is related to increased plaque which is associated with increased oral flora.
   - Dental and nursing research indicate that frequent oral cleansing in healthy individuals produces and maintains healthy oral tissue.

2. Suggest to the patient's physician that a dental consult be initiated prior to chemotherapy in patients with existing periodontal disease:
   - for cleaning of the teeth,
   - to assess and document the condition of the patient's oral structures,
   - to initiate appropriate therapy for pre-existing disease.
3. Prior to chemotherapy, instruct patient in methods to maintain good oral hygiene:
   - Assess patient's knowledge/understanding of good oral hygiene.
   - Instruct patient to brush teeth, gingival mucosa and tongue after meals and before bedtime with a soft toothbrush and dentifrice.
   - Suggest use of mouthwash or water to remove debris after brushing. Suggest use of dental floss at least once a day.
   - Suggest periodic use of disclosing agent to identify areas of plaque accumulation. (Example: Place a small amount of green food coloring with an applicator stick to gingival tissue and teeth. Dye adheres to plaque accumulation.)
4. During and after chemotherapy:
   - Inform patient that bone marrow depression (an anticipated side-effect with some agents) predisposes patient to infection and/or bleeding which can further compromise the status of the patient's oral cavity.
   - Suggest the frequent, gentle use of soft bristle toothbrush, Toothette® to clean teeth, gums and tongue. Frequent cleaning (at least every three hours while awake) will maintain a low population of oral flora.
   - Suggest the use of non-irritating mouthwashes (e.g. Hydrogen Peroxide 1:2 or 1:3, saturated solution of sodium bicarbonate to which Pycopay tooth powder has been added for flavor) to help loosen secretions and remove debris.
   - Instruct patient to use anesthetic applications (Xylocaine Viscous or Chloraseptic) before cleaning and meals.
   - Instruct patient to inform the physician if dentures cause pain and/or ulceration. (Weight loss may produce ill-fitting dentures.)
   - Inspect patient's oral cavity on a daily basis to detect any change in the mucous membrane. Inform physician and document any changes.
5. If stomatitis occurs:
   - Consider use of oral suction with a Yankauer tip applicator to remove excess saliva. Instruct patient to roll saliva forward to permit easy removal without tissue damage.
   - Suggest to physician glyoxide oral preparation as a cleaning agent when candidiasis, etc., occurs.
   - Suggest to physician mycostatin mouth-wash/mycostatin vaginal suppositories to combat fungal infection.

Chemotherapy Drugs, Hormones (Androgens and Estrogens) and Corticosteroids: Side Effects and Nursing Actions

Drug	Side Effects	Nursing Actions
ACTINOMYCIN-D (DACTINOMYCIN) (COSMEGEN) *Antibiotic:* Derived from Streptomyces species. Intercalates with minor groove of DNA helix and inhibits RNA transcription. *Storage:* 0.5 mgm vials, yellow powder, room temperature. Dissolve in 2.0 ml water. Discard remainder. Light sensitive. *Administer:* Intravenous *Excretion:* Primarily excreted by liver.	Necrosis of tissues at site of extravasation.	Refer to page 6. and page 7.
	Nausea and vomiting, diarrhea	Refer to page 3.
	Stomatitis and oral ulceration	Refer to page 8.
	Bone marrow depression	Refer to page 4 and page 5.
	Alopecia	Refer to page 5 and page 6.
	Acne, rash	Reassure patient that this is a temporary side effect.
	Enhances radiation effect and may require reduction in radiation dose. May reactivate erythema in previous radiation sites.	Reassure patient that chemotherapy and radiation combination add to effectiveness of tumor therapy.
	Impaired excretion with liver damage.	Instruct patient to report any change of color of skin or mucous membrane.
	Malaise, fever, myalgia	Inform patient of this possibility. Instruct patient to report fever and/or malaise.

Drug	Side Effects	Nursing Actions
ADRIAMYCIN (DOXORUBICIN) *Antibiotic:* Derived from *streptomyces peucetius.* Intercalates with major groove of DNA helix; prevents both DNA transcription and replication. *Storage:* 10 mgm and 50 mgm vials; red-orange crystals. Room temperature. Dissolve in 2 or 10 ml sterile water respectively. Stable 48 hours at 4°C. Light sensitive. *Administer:* Intravenous *only.* **Note:** 550 mgm/M^2 limiting life-time dose. More can be given if risk/benefits are weighed. Metabolized by liver and excreted in bile and urine.	Bone marrow depression	Refer to page 4 and page 5.
	Alopecia	Refer to page 5 and page 6.
	Cardiomyopathy	Instruct patient to report sudden weight gain, shortness of breath, swollen ankles. Stress the importance of chest X-ray and EKG before therapy.
	Urinary discoloration	Inform patient that first voidings after therapy usually consist of pink-red urine due to rapid excretion of drug. Inform patient that adequate hydration promotes drug excretion.
	Stomatitis, esophagitis, mucositis	Refer to page 8.
	Nausea and vomiting	Refer to page 3.
	Severe tissue necrosis at site of extravasation	Refer to page 6 and page 7. Administer drug under constant observation. Check patency of I.V. line every 2-3 minutes. Instruct patient to report any discomfort of the I.V. site immediately.
	Sensitivity to sun	Instruct patient in use of sun screen.
	Local hypersensitivity during drug infusion (e.g. hives, itching)	Quickly verify patency of I.V. line. If line is patent, slow rate of infusion and apply ice to area. Observe patient for 20-30 minutes. Hives and itching will disappear. Document allergic reaction on chart.

Drug	Side Effects	Nursing Actions
ALLOPURINOL (Zyloprim) Used for prophylactic treatment in patients receiving chemotherapy Acts on purine catabolism *Storage:* 100 mgm and 300 mgm *Administer:* Oral Intravenous (Investigational)	Hyperuricemia may be secondary to disease or to the breakdown of tumor cells by alkylating agents and/or antimetabolites	Instruct patient in the purpose and importance of taking Allopurinol as prescribed.
	Excreted only by the kidney	Instruct patient to maintain oral fluids at two (2) liters per day (adult) to prevent renal problems.
	Hepatotoxicity	Instruct patient in importance of follow-up blood work (liver studies).
		Instruct patient to report changes in color of skin or mucous membrane.
	Drowsiness (rare)	Caution patient about limiting activities such as driving a car, etc.
	Skin rash or urticarial lesions (idiosyncratic reaction)	Inform patient skin lesions will disappear upon reduced dose or drug elimination.
	Patients receiving 6MP or Imuran will require a reduction in dosage by 60-75% during Allopurinol administration.	Inform patient that doses of 6MP or Imuran will be increased when Allopurinol is discontinued.
	Diarrhea, mild abdominal pain	Refer to page 3.
	Mild fever	Refer to page 4.

Drug	Side Effects	Nursing Actions
M-AMSA (Acridinylaniside) Inhibits DNA synthesis by binding to DNA double helix.	Gastrointestinal: nausea, vomiting, diarrhea, anorexia; (nausea appears to be a cumulative effect)	Refer to page 3.
Storage: 2 sterile liquids that must be combined for use. (1) 1.5 ml ampule containing 75 mgm AMSA (75 mg/vial) (2) 20 ml amber vial containing 13.5 ml diluent.	Bone marrow depression	Refer to page 4 and page 5.
	Liver toxicity	Instruct patient in importance of follow-up blood work. Stress importance of reporting abdominal distress or changes in skin color.
Combined: orange-red solution 5 mgm/ml.	Renal toxicity	Instruct patient in importance of follow-up blood work. Instruct patient to report changes in urinary pattern or back pain.
Storage: Under refrigeration before reconstitution.		
Reconstituted: Stable for 4 hours at room temperature; dilute further with D^5W. Do not mix with solutions containing chloride. Do not refrigerate after dilution.	Phlebitis	Instruct patient to report symptom(s) of pain, tenderness, redness, and/or swelling. Inform patient of need to treat phlebitis with ice to site continuously for 24 hours. No heat or steroid cream needed.
Administration: I.V. infusion over 1 hour in 500 ml D^5W. (Adjust with pediatric patients)		
Investigational agent		

Drug	Side Effects	Nursing Actions
5 AZACYTIDINE (5-AZACR)	Severe nausea, vomiting and diarrhea	Refer to page 3.
Antimetabolite: Pyrimidine nucleoside analogue (blocks RNA and DNA synthesis and prohibits synthesis of protein).	Bone marrow depression	Refer to page 4 and page 5.
	Fever within 1-2 hours of infusion	Inform patient of fever possibility. Fever lasting over 8 hours should be reported to physician/ nurse.
Storage: white powder with 100 mgm of 5 Azacytidine and 100 mgm of Mannitol. Keep refrigerated. Dissolve in 19.9 ml of saline then further dissolve in Ringer's Lactate. Use within 3 hours.	Hepatotoxicity	Instruct patient in regard to importance of blood work (liver studies). Alert patient to report changes in color of skin and mucous membranes.
Administer: I.V. infusion. Stable up to 3 hours in Ringer's Lactate.	Neuromuscular toxicity, weakness	Instruct patient about possibility of neuromuscular toxicity: leg cramps, parasthesias, tremors. Report any evidence to physician/ nurse.
Investigational agent		

Drug	Side Effects	Nursing Actions
BIS CHLORETHYL NITROSOUREA (BCNU) *Carmustine Antimetabolite* and *alkylating agent:* has the ability to cross blood-brain barrier.	Pain along the course of the vein during administration.	Reassure patient that pain is temporary; application of hot packs may provide symptomatic relief. Infuse slowly to prevent vein irritation.
Storage: Store unreconstituted drug in refrigerator; 100 mgm/vial, white powder dissolved in 3 ml of absolute ethanol and then in 27 ml sterile water. Drug is then dissolved in about 250 ml Normal Saline and given over 30-60 minutes. It is unstable in solution and must be administered immediately after reconstitution.	Skin flush and vertigo. Chest pains may occur during infusion.	Reassure patient that this is due to alcohol diluent. Infuse drug *slowly.*
	Bone marrow depression (may be delayed 3-5 weeks after drug administration)	Refer to page 4 and page 5.
	Nausea and vomiting.	Refer to page 3.
	Phlebitis	Instruct patient to report any signs of swelling, pain, skin discoloration at intravenous site.
Administer: I.V. push of BCNU causes pain, burning senation and acute "high" due to alcohol center. BCNU should be given as an infusion to avoid these sensations.	Pulmonary toxicity has been reported after prolonged use.	Inform patient of need for follow-up chest x-ray. Instruct patient to report cough, shortness of breath to physician/nurse.

Drug	Side Effects	Nursing Actions
BLEOMYCIN (Blenoxane) *Antibiotic:* Derived from strain of *Streptomyces verticillus.* Binds DNA causing scission and fragmentation of helix. *Storage:* 15 u/vial, white crystals, room temperature. Dissolve in 1 ml. saline = 15u/ml for IM/sc use. Dissolve in 5ml = 3u/ml to be diluted for I.V. use. Stable 7 days at 4°C. *Administer:* Intravenous, Intramuscular* Subcutaneous, Intracavitary. *Excretion:* Primarily excreted by kidneys **Intramuscular is painful; mix with Lidocaine 1%. (Usual injection 0.2 ml of Lidocaine 1%)*	Pneumonitis, Pulmonary Fibrosis	Instruct patient to report to physician symptoms of cough, dyspnea, low grade fever, etc.
	Skin changes such as induration, erythema and/or macular rash in fingers and hands or in areas of previous radiation therapy. Hyperpigmentation; progressive rash.	Instruct patient to be alert to changes in appearance and sensation of skin (e.g., redness, scaling, tingling).
	Elevated temperature and chills after receiving therapy. (Occurs in 30 minutes; lasts up to 6 hours)	Instruct patient that temperature elevation could be allergic response and not infection. Patient should inform physician of fever persisting more than 24 hours.
	Nausea and vomiting; anorexia and weight loss	Refer to page 3.
	Stomatitis	Refer to page 8.
	Allergic reaction (fever, hypotension, anaphylaxis)	Anaphylactic or hypotensive reaction may occur after first dose. Prepare room with suction, oxygen, and emergency drugs. Inform patient that staff is prepared for possible allergic reaction. Instruct patient to report changes in breathing as soon as they occur. Patient should be kept under constant observation during and for 1 hour after infusion completed.
	Alopecia	Refer to page 5 and page 6.

Drug	Side Effects	Nursing Actions
BUSULFAN Myleran Alkylating agent; is a sufonic mustard *Storage:* Tablets 2 mgm. Store at room temperature *Administer:* Oral *Excretion:* By kidneys	Bone marrow depression. Mainly WBC, which is dose-related, but with continued therapy thrombocytopenia and anemia may occur.	Refer to page 4 and page 5.
	Nausea and vomiting	Refer to page 3.
	Renal toxicity, hyperuricemia	Drug is excreted by the kidneys. Instruct patient to maintain a fluid intake of 1500-2000 ml/day.
	Alopecia	Refer to page 5 and page 6.
	Amenorrhea and hot flashes in women; testicular atrophy with gynecomastia and impotence in men.	Inform patient of these side-effects which *may* be limited to period of drug intake only.
	Wasting Syndrome: resembling adrenal insufficiency; skin hyperpigmentation, severe weakness, fatigue, anorexia, weight loss.	Instruct patient to report prolonged anorexia and weight loss.
	Pulmonary Fibrosis (intraalveolar) after prolonged dosages. (May be fatal if patient is not carefully monitored)	Instruct patient to report periods of dyspnea and/or dry cough. Inform patient of need for careful monitoring (e.g. chest x-ray).

Drug	Side Effects	Nursing Actions
CALCIUM LEUCOVORIN (Folinic acid) (citrovorum factor) "Leucovorin Rescue" Is an active form of folic acid which bypasses the Methotrexate-induced metabolic block and reduces the systemic effect of Methotrexate. Is superior to folic acid as antidote to a folic acid antagonist. Has an affinity for normal cells and will "rescue" normal rather than cancer cells. *Storage:* oral tablets, 5 mgm; 3 mgm ampules, 50 mgm vials. Reconstitute the vials with 5 ml of water. Use as soon as possible; store reconstituted vials in refrigerator for no longer than 7 days. *Administer:* Oral tablets, intravenous or intramuscular injection every 3, 6, or 8 hours continued or discontinued in relation to Methotrexate serum levels. 5 X 10^{-7}mo/l is the level that is generally considered safe. *Dose:* Competitive aspect in that the higher the dose of MTX used, the greater the amounts of leucovorin required.	Allergic hypersensitivity. Missed doses of leucovorin increase patient risk to major MTX toxicity.	Instruct patient to report any signs or manifestations of hypersensitivity, (e.g. rash, changes in respiration, etc). Administer calcium leucovorin doses promptly and monitor serum MTX levels. Report any evidence of possible MTX toxicity (e.g. oral mucositis). Instruct patient of importance in maintaining dosage schedule and importance of monitoring blood levels prior to discharge.

Drug	Side Effects	Nursing Actions
CCNU (1(2-chloroethyl) 3-cyclohexyl-1-nitrosourea) Lomustine Antimetabolite and alkylating agent; has the ability to cross the blood-brain barrier.	Nausea and vomiting occurs 45 minutes to 6 hours after dose.	Refer to page 3.
	Bone marrow depression (May be delayed 4-6 weeks after dose is administered).	Refer to page 4 and page 5.
Storage: 10, 40, 100 mgm capsules, refrigerate; avoid moisture; stable at 4° C. *Administer:* Oral; take at bedtime; no food or drink for 2 hours. *Note:* Instruct patient regarding the difference in appearance of capsules (dosage variance) and explain that all capsules dispensed are to be consumed at one time.	Hepatotoxicity	Instruct patient in regard to importance of follow-up blood work chemistry studies (liver studies). Alert patient to report changes in skin and mucous membrane.

Drug	Side Effects	Nursing Actions
CHLORAMBUCIL Leukeran Alkylating agent: is an oral nitrogen mustard compound.	Bone marrow depression. Mainly leukopenia.	Refer to page 4 and page 5.
	Mild nausea and vomiting.	Refer to page 3.
Storage: Tablets 2 mgm. Store at room temperature *Administer:* Oral	Liver toxicity (rare)	Inform patient of importance of periodic liver function studies. Liver toxicity may indicate a hypersensitivity reaction.

Drug	Side Effects	Nursing Actions
CHLOROZOTOCIN A synthetic analogue of chloroethynitrosoureas with alkylating activity.	Nausea and vomiting	Refer to page 3.
	Bone marrow depression	Refer to page 4 and page 5.
Storage: lypholized powder 200 mgm in 10 ml vials; reconstitute with sterile water or sodium chloride. Store in refrigerator. Reconstituted solution is stable at room temperature for 3 hours. Unstable if mixed with fluid ph>6.	Nephrotoxicity	Instruct patient to drink fluids at home before chemotherapy, during and after chemotherapy (3000-4000 ml/day).
	Hepatotoxicity	Stress importance of follow-up blood work (liver studies). Instruct patient to report change in color of skin or mucous membrane.
Administer: Rapid intravenous infusion; but inject drug with *slow* I.V. push.	Burning and irritation at the site of drug administration. May be secondary to extravasation.	Instruct patient to report symptoms of pain or burning at site of I.V. while receiving chemotherapy. If burning occurs, slow rate of I.V. or further dilute drug by "piggy-backing" into vehicle used for administration. Rinse vein well at conclusion of therapy.
Investigational agent		

Drug	Side Effects	Nursing Actions
CIS-PLATIN CIS-Platinum (heavy metal derivative) (CIS-Diamminedi-chloro-Platinum II), (CPD) or (DDP) *Storage:* Store in refrigerator intact in 10 mgm or 25 mgm vial with Mannitol 100 mgm and sodium chloride 90 mgm. Dissolve 10 mgm in 10 ml sterile water or normal saline. Use 25 ml for 25 mgm vial. Discard unused portion. *Administer:* I.V. Once reconstituted, the solution should be kept at room temperature until further diluted. Diluted solution of less than 500 mgm/ml of drug may be refrigerated. Exposure to normal room light has no effect on stability for at least 72 hours. Drug is most stable when administered in normal saline.	Renal toxicity	Instruct patient to collect 24-hour urine for creatinine before first day of platinum therapy to be used as a baseline. Inform patient that on day of therapy, he will receive hydration therapy, followed by Mannitol to flush kidneys before receiving CIS-Platinum. (NCI-Medicine Branch patients may receive Mannitol before and after DDP therapy). Specific gravity of urine is used to indicate adequate hydration before infusing Mannitol and CIS-Platinum. Instruct patient to continue oral fluids after therapy.
	Severe nausea and vomiting, loss of taste.	Refer to page 3.
	Bone marrow depression (primarily leukopenia)	Refer to page 4 and page 5.
	Allergic reaction (shortness of breath, rash, pruritis, erythema; progressing to seizures and anaphylaxis.)	Prepare patient's room with oxygen, suction, emergency drugs, and padded tongue blade. Inform patient that staff is prepared for possibility of allergic reaction. Instruct patient to report any shortness of breath, chills, itching that occurs. Observe patient during infusion and for one hour afterward.

Drug	Side Effects	Nursing Actions
CIS-PLATIN, *continued*	Ototoxicity is irreversible	Inform patient of possibility. Request that patient report any decrease or abnormality in hearing. Inform patient about audiogram, using patient information pamphlet.
	Peripheral neuropathy	Instruct patient to report numbness, tingling of feet and hands.
	Low serum magnesium	Instruct patient to report tremors, increased nervousness, weakness to physician/ nurse.

Drug	Side Effects	Nursing Actions
CORTICOSTEROIDS	Increased appetite	Suggest small, frequent meals.
Route of Administration Prednisone: PO Prednisolone: PO or IM Methylprednisoione: PO, IM, IV Prednisolone Sodium Succinate: IV (Investigational) Cortisone Acetate: PO or IM Hydrocortisone: PO, IM, IV Dexamethasone: PO, IM, IV	Facial flushing	Reassure patient that facial flushing is only temporary.
	Hypertension (sodium and fluid retention)	Report headache or dizziness; stress importance of vital signs (weight, blood pressure and blood electrolytes).
	Stomach "burning", nausea, vomiting, (gastric bleeding/ ulcers)	Suggest use of antacids, milk and ice cream; avoid empty stomach.
	Increased excretion of sugar in urine: diabetes (in adult)	Instruct patient to be alert to frequency of voiding; instruct in urine testing for sugar and acetone if ordered by physician.
	Increased dermal sensitivity to ultraviolet light	Instruct patient to request and use sun-screen.
	Body loss of potassium	Suggest replacement with foods high in potassium (e.g., banana, orange juice) and/or medication.
	Immunosuppression	Instruct in preventive measures in infection/ poor wound healing.
	Cushingoid appearance	Reassure patient that he/she will return to normal appearance after completion of corticosteroid therapy.

Equivalent Doses of the Corticosteroids

Generic Name	Equivalent Dose (mg.)
Cortisone	25
Hydrocortisone	20
Prednisone	5
Prednisolone	5
Methyl prednisolone	4
Triamcinolone	4
Paramethasone	2
Dexamethasone	0.75
Bethamethasone	0.75

Source:
Nursing 75
November 1975

Administer: Multitablet dosages may be put in size zero empty capsules for ease of administration.

Drug	Side Effects	Nursing Actions
	Personality changes (mood swings, depression, anxiety)	Inform patient of possibility of personality changes; provide emotional support. Inform patient of possible disruptions in sleep patterns and insomnia.
	Hyperadrenocorticism or adrenal atrophy	Professional staff should be aware of this possibility. Dosage modification may be necessary for surgery or dental procedure.
	Skeletal muscle wasting; osteoporosis secondary to protein mobilization and use.	Inform patient that this is secondary to high doses for long periods of time.
	Acne	Inform patient that this may occur, but stress that it is temporary; may need acne preparation.

Drug	Side Effects	Nursing Actions
CYTOSINE ARABINOSIDE (Cytosar U.) Cytarabine Arabinsosyl Cytosine Antimetabolite; pyrimidine nucleoside analogue; blocks DNA synthesis	Depression of primary immune response. Bone marrow depression.	Refer to page 4 and page 5.
	Severe nausea and vomiting, diarrhea.	Refer to page 3.
	Lower abdominal pain.	Instruct patient to inform physician/ nurse.
Storage: 100, 500 mgm/vial. Light yellow powder.	Metabolized by liver; hepatoxicity.	Instruct patient in regard to importance of liver function studies. Alert patient to report changes in color of skin and mucous membrane.
For IV use: dilute with 10-20 ml of water; may then dilute further with D_5W. Stable for 12 hours, non-refrigeration.	Stomatitis, esophageal and upper gastrointestinal ulcerations.	Refer to page 8.
For S.C. Use: dilute with 2.5 ml sterile water to make 200 mgm/ml and 500 mgm/vial.	Dermal sensitivity to sunlight.	Inform patient of necessity for sun screening medication.
For IT use: dissolve in Elliot's B solution.	Alopecia	Refer to page 5 and page 6.
Administer: Intravenous, Intrathecal, Intramuscular, Subcutaneous, Intracavitary.	Arachnoiditis and rare neuropathies after intrathecal use.	Instruct patient to report headaches, tingling, weakness to physician/nurse.
	Transient confusion, lethargy, weakness.	Instruct patient not to operate automobile or machinery immediately after receiving medication until patient has received several doses of medication and can predict reaction.

Drug	Side Effects	Nursing Actions
CYTOSINE ARABINOSIDE, *continued* *Excretion:* by kidneys *Precautions:* *Subcutaneous:* painful injection. Prepare site with application of ice. Apply pressure to site for 2-3″ after injection to prevent capillary bleeding. *Intrathecal:* if patient is receiving both systemic and IT therapy, IT dose may replace a systemic dose. *Intravenous:* prolonged exposure of cells to cytotoxic blood levels more effective than single or pulse doses. May be administered in continuous 12 hr. or 8 hr. infusions. Crosses the blood-brain barrier in continuous infusions.		

Drug	Side Effects	Nursing Actions
CYCLOPHOSPHAMIDE, (CYTOXAN) Alkylating agent, is a nitrogen mustard derivative. *Storage:* 100, 200, 500 mgm/vial, white powder for I.V. use. 25, 50 mgm tablet for oral use. Store both at room temperature. *For I.V. Use,* dissolve powder in Sterile Water, D^5W or Saline; stable at 4° C for 24 hours. *Administer:* Oral: take before noon with additional fluids. Intravenous: may be I.V. push or infusion bottle. *Metabolized:* By liver to active metabolites.	Hemorrhagic cystitis	Instruct patient to take pills in morning with breakfast. Inform patient that drug is excreted by the kidneys. Exposure of bladder wall for prolonged periods to drug will cause mucosal ulceration. Instruct patient to maintain hydration before, during and after chemotherapy (3,000-4,000 ml/day). Instruct patient that bladder should be emptied at least every *four hours, day and night,* for two days after chemotherapy. Instruct patient to report any frequency, urgency or blood in urine to physician/nurse.

Drug	Side Effects	Nursing Actions
CYCLOPHOSPHAMIDE, *continued*	Bone marrow depression	Refer to page 4 and page 5.
Excreted: By kidneys	Nausea and vomiting	Refer to page 3.
	Alopecia	Refer to page 5 and page 6.
	Facial flushing during infusion.	Reassure patient that facial flushing is drug-related. If facial flushing occurs, slow infusion of drug.
	Cardiomyopathy (high doses)	Provide reassurance concerning possibility of cardiac toxicity. Stress the value of EKG and chest X-ray before therapy.
	Sterility: amenorrhea aspermia	Inform patient of this possibility.
	Hyperpigmentation	Instruct patient to observe for skin discoloration, browning, (may be permanent subsequent to prolonged use.) Fingernails may become brown/black, either in bands or lines.

Drug	Side Effects	Nursing Actions
DAUNOMYCIN (DAUNORUBICIN) (RUBIDOMYCIN)	Bone marrow depression	Refer to page 4 and page 5.
	Stomatitis, mucositis	Refer to page 8.
Antibiotic: derived from *Streptomyces peucitius.* Intercalates with minor groove of DNA helix; prevents both DNA transcription and replication.	Febrile reaction	Inform patient of possibility of fever which is drug-related vs. fever from infection. Instruct patient to report fever persisting for 24 hours after drug.
Storage: 20 mgm vial, orange red crystals. Room temperature. Dissolve in 4 m1. of water. Discard 6 hours after mixing. Protect from light after reconstitution.	Cardiomyopathy	Stress importance of chest x-ray and EKG. Instruct patient to report dypsnea, weight gain, swollen ankles, to physician/nurse.
Administer: Intravenous	Nausea and vomiting	Refer to page 3.
	Alopecia	Refer to page 5 and page 6.
Note: 550 mgm/M^2 is the limiting life-time dose. More can be administered if risk/benefits are weighed.	Urinary discoloration (first voiding after therapy).	Inform patient that urine will be orange-colored following drug administration for 8-24 hours.
Excretion: Impaired excretion with liver damage.	Tissue necrosis at site of extravasation	Refer to page 6 and page 7.
	Phlebitis	Instruct patient to report any pain, redness, tenderness or swelling in extremity which was intravenous site.

Drug	Side Effects	Nursing Actions
DTIC, DACARBAZINE Imidazole Carboxamide Imidazole Mustard Alkylating agent *Storage:* 100, 200 mgm/vial white powder, refrigerate. Dilute with 9.9 ml sterile water or 19.7 ml sterile water. Stable for 72 hours at 4°C or 8 hours at 20°C. *Administer:* intravenous. Protect from light; avoid extravasation. *Excretion:* Primarily from kidneys.	Burning during infusion. Metallic taste in mouth during infusion.	Instruct patient to report any pain or discomfort during infusion. Rinse vein well after infusion: infuse carefully.
	Tissue necrosis with extravasation.	Instruct patient to apply ice pack *constantly* to infusion site for 24 hours.
	Nausea and vomiting	Refer to page 3.
	Bone marrow depression (rare) May be delayed 2-4 weeks post therapy.	Refer to page 4 and 5.
	"Flu-like Syndrome" starts 10 days after dose (headache, malaise, may persist up to 21 days.)	Inform patient that a physician may need to differentiate symptoms from drug toxicity. Instruct patient to check and record temperature.
	Pulmonary, Liver, Renal, CNS effects (delayed)	Instruct patient to report any symptoms such as: difficulty in voiding, respiratory distress, disturbance in gait, hand tremors, nausea and vomiting.
	Skin rash (delayed)	Inform patient that delayed skin rash may be a toxic effect and will disappear.
	Alopecia	Refer to page 5 and page 6.
	Photosensitivity (rare)	Inform patient of need for sunscreen.

Drug	Side Effects	Nursing Actions
5-FLUOROURACIL Flourouracil, 5 FU Adrucil Antimetabolite: Alters RNA synthesis and function. Blocks DNA metabolism. *Storage:* 500 mgm/10 ml ampule, clear liquid. Room temperature. Warm slightly to get crystals into solution. *Administer:* Intravenous, Intracavitary, oral, Intraperitoneal *Excretion:* Drug is metabolized by liver; excreted by kidneys. Dose is decreased in patients with impaired renal or hepatic function. Is contraindicated in patients with poor nutritional state.	Nausea, vomiting, diarrhea	Refer to page 3.
	Stomatitis, oral and gastrointestinal mucositis followed by ulceration	Refer to page 8.
	Alopecia	Refer to page 5 and page 6.
	Bone marrow depression	Refer to page 4 and page 5.
	Dermatitis in exposed skin areas.	Instruct patient to report symptoms of itching, rash, pigmentation.
	Ataxia, neurological deficits	Sunlight may intensify reaction. Instruct patient to report loss of balance or lack of coordination.
	Hepatotoxicity in patients with compromised liver.	Inform patient of importance of follow-up liver function studies.
	Conjunctivitis	Instruct patient to report burning, itching, redness, epiphora or "sandy" sensation in eye to physician/nurse.

Drug	Side Effects	Nursing Actions
GLUTAMINASE (Achromobacter Glutaminase) *Enzyme* derived from *pseudomonas* bacteria. Cytotoxicity due to depletion of glutamine in cell. *Storage:* lypholized powder containing 2000 IU/vial. Reconstituted solution stable at 22°C for 24 hours. Human albumin must be added to solution to prevent protein denaturation. *Administer:* Continuous intravenous infusion; drug dose diluted in 1000 ml normal saline with human albumin. *Investigational Agent*	Protein hypersensitivity may lead to anaphylaxis.	Prepare patient's room with suction, oxygen, emergency drugs. Monitor vital signs before infusion and q4hours afterwards. Inform patient that nursing staff is prepared for this possibility. Instruct patient to report any change in status during or after infusion (e.g. difficulty in breathing).
	Hyperglycemia	Nurse should be aware that glutaminase precipitates hyperglycemia. Instruct patient to report abdominal pain, signs of urinary frequency, or dizziness. Stress need to monitor blood glucose levels.
	Nausea and vomiting.	Refer to page 3.
	Protein and coagulation abnormalities	Counsel patient in importance of regular blood chemistry and coagulation studies. Report any bleeding problems.
	Leukopenia, thrombocytopenia	Refer to page 4 and page 5.
	Elevated blood protein and uric acid (Elevated ammonia may lead to coma)	Inform patient of necessity of follow-up blood work.
	Transient fever	Inform patient of possibility and need to report fever to staff members.

Drug	Side Effects	Nursing Actions
HEXAMETHY-MELAMINE (HXM) Synthetic compound resembling alkylating agent *Storage:* Hard gelatin capsule 50 mgm and 100 mgm. Store at room temperature, tightly sealed *Investigational Agent* *Administer:* Oral Excretion: in urine	Gastrointestinal: Nausea and vomiting diarrhea, abdominal cramps. May be severe with high doses (single agent therapy). Well tolerated at lower doses.	Refer to page 3.
	Weakness, weight loss, anorexia	Instruct patient in use of small, frequent feedings and importance of rest. Stress this as side effect of drug.
	Mild bone marrow depression	Refer to page 4 and page 5.
	Erythematous, maculopapular or eczematous rash	Instruct patient to report skin changes or rash
	Peripheral neuropathy, may exacerbate neurotoxicity from previously administered Vincristine	Instruct patient to report numbness, tingling, increased sleepiness, changes in balance, or coordination, or changes in mental status to physician/nurse.

Drug	Side Effects	Nursing Actions
Hormones-Estrogens **DIETHYLSTIL-BESTROL** (DES) Stilbestrol Administer by mouth oral tablets 1, 5, 100 mgm (also enteric coated tablets) *Metabolism:* hepatic *Excretion:* in urine	Nausea and vomiting with large doses	Refer to page 3.
	Gynecomastia in men; breast tenderness in women; cramps	Inform patient of possibility, and that symptoms will cease when drug is discontinued.
	Fluid retention, risk of congestive heart failure and cardiovascular deaths in men with cancer of prostate is increased.	Instruct patient to report weight gain, headache, ankle edema, dizziness, and chest pain to physician. Inform patient of necessity to inform physician of elevated blood pressure.
	Serum calcium can rise rapidly (following prolonged therapy)	Inform patient of need for monitoring blood calcium levels. Diet adjustment to low calcium may be necessary.
	May cause vaginal cancer in offspring.	Inform patient of this possibility.
	Lassitude, depression, anxiety insomnia, headache	Inform patient that these symptoms are drug-related.
	Endometrial hypertrophy and uterine bleeding	Inform patient of possibility and instruct patient to report bleeding to physician/nurse.

Drug	Side Effects	Nursing Actions
Hormones—Estrogens **ETHINYL ESTRADIOL** Oral tablets: 20, 50, 500 mcg. Estradiol Benzoate injection in oil for intramuscular use *Metabolism:* hepatic *Excretion:* in urine	Fluid retention	Inform patient of need for monitoring weight and blood pressure.
	Hypercalcemia	Inform patient of need for monitoring blood calcium levels.
	Feminization	Inform male patient that this will occur, but symptoms will cease when drug is discontinued.
	Uterine bleeding	Instruct patient to report all bleeding.
	Increased coronary artery disease and mortality due to cardiovascular complications in adult males treated with estrogens.	Instruct patient to report headache, dizziness, chest pains, etc., to physician.

Drug	Side Effects	Nursing Actions
Hormones—Androgens **FLUOXYMESTERONE** (Halotestin) *Administer:* Oral tablets 2 mgm, 5 mgm, 10 mgm	Nausea and vomiting, anorexia	Refer to page 1.
	Hot flashes, myalgia, libido changes, virilization in women, deep voice, hirsutism, baldness	Inform patient of possible complications; symptoms will cease when drug is discontinued. Gradual onset of symptoms.
TESTOSTERONE PROPIONATE (Oreton) *Administer:* Intramuscular Aqueous suspension	Fluid retention	Inform patient of need for monitoring weight and blood pressure. Instruct patient to report sudden weight gain, shortness of breath, and/or ankle edema to physician/nurse.
	Hypercalcemia	Encourage exercise of all limbs. Immobilized patients are more likely to develop hypercalcemia (especially if bone lesions are present).
	Liver function abnormalities and increased red blood cell mass.	Instruct patient of need to report headache, dizziness, changes in skin color, etc., to physician/nurse.

Drug	Side Effects	Nursing Actions
Hormones—Estrogens		
PROGESTERONE	Local abscess and pain at injection site	Use aseptic technique to prepare and administer medication. Use heat to relieve pain.
a) *Hydroxyprogesterone* Caproate (Delalutin) *Administer:* Intra-muscular 250 mgm vial	Thrombotic disorders Pulmonary embolism Cerebrovascular accident	Instruct patient to report signs of thrombophlebitis, dizziness, headache, to physician/nurse.
b) *Medroxy Progesterone Acetate* (Provera) (Depo-Provera) *Administer:* Intra-muscular, Oral tablets: 2.5 & 10 mgm. Parenteral injection: 50, 100, 400 mgm/ml	Gastrointestinal irritation: nausea and vomiting, anorexia, abdominal cramps	Refer to page 3.
	Changes in libido, hirsutism, breast tenderness, vaginal bleeding	Inform patient that increased sex drive is common.
	Abnormal liver function	Inform patient of need to monitor liver function with blood chemistry evaluation.
c) *Megestrol Acetate (Megace) Administer:* Oral 20 mgm tablets	Hypercalcemia, secondary to disease	Inform patient of need to observe for skin changes. Inform patient of need to monitor serum calcium level and importance of maintaining mobility.
	Fluid retention	Inform patient of need to monitor weight and blood pressure. Instruct patient to report sudden weight gain, shortness of breath and/or ankle edema to physician/nurse.

Drug	Side Effects	Nursing Actions
HYDROXYUREA (HYDRA) (HU) Antimetabolite: is a synthetic agent; blocks DNA synthesis.	Nausea, vomiting, diarrhea.	Refer to page 3.
Storage: 500 mgm capsules 2 gram vial, white powder. Room temperature. Dilute with 18.5 ml. of water; for further dilution use D_5W. Store in refrigerator after dilution; stable for 48 hours at 4°C.	Bone marrow depression with rapid fall of white blood count, platelets and hemoglobin.	Refer to page 4 and page 5.
	Alopecia	Refer to page 5 and page 6.
	Stomatitis and gastrointestinal ulcerations.	Refer to page 8 and page 9.
Administer: Oral. Intravenous is investigational. Used to lower very high white blood count rapidly in patients with leukemia.	Drug is synergistic with radiotherapy and may cause an erythema.	Reassure patient that combination of chemotherapy and radiotherapy is the most beneficial treatment for tumor. Advise patient of possible erythema.
Metabolism: partially by liver Excretion: in urine	Elevation of serum uric acid, secondary to depressed kidney function	Instruct patient in importance of follow-up blood work (kidney function tests).
	Rash, pruritis.	Instruct patient to report any change in condition of skin.

Drug	Side Effects	Nursing Actions
ICRF 187 (NSC =169780) Acts as an alkylating agent in late prophase and early metaphase: inhibits DNA synthesis *Storage:* Store at room temperature 30 ml vials containing 250 mgm lypholized ICRF-187. Reconstitute with 25 ml Sodium Chloride. Stable for 8 hours at 22-25°C. Requires further dilution with saline or D_5W for administration. Discard remainder after original reconstitution. *Administer:* Intravenous (Investigational) Infuse; do not "push"	Gastrointestinal toxicity: anorexia, nausea, vomiting, diarrhea, weight loss.	Refer to page 3.
	Bone marrow depression: leukopenia, thrombocytopenia	Refer to page 4 and page 5.

Drug	Side Effects	Nursing Actions
L-ASPARAGINASE (ELSPAR) (L-Asp) is an enzyme which is isolated from extracts of bacterial cultures *E. Coli* (Merck Company) and *Erwina Cartova* (Porton Company) *Administered:* Intravenously or Intramuscularly. *Storage:* 10,000 unit vial white powder. Refrigerate. Reconstitute with 2 ml H^2O or saline. Stable 48 hours at 4°C. Use only clear solution. To prevent protein denaturation, do not shake solution.	Protein hypersensitivity may lead to anaphylaxis. When given intramuscularly, delayed hypersensitivity may occur (2 to 24 hours).	Prepare patient's room with suction, oxygen, emergency drugs. Monitor patient after therapy for 1 hour. Instruct patient that staff is prepared for this possibility. Patient/family can assist by avoiding oral foods or gum during/after therapy. Patient may assist by reporting any change in status 24 to 48 hours after dose, to physician/nurse.
	Hyperglycemia (may lead to coma)	Monitor urine output for sugar/acetone. Instruct patient to report frequent voiding.
	Malaise, lethargy, somnolence	Instruct patient to report abdominal pain, signs of urinary frequency, or dizziness. Monitor blood sugar levels.
	Anorexia, weight loss, abdominal pain	Refer to page 3. Report abdominal pain to physician/nurse.
	Nausea and vomiting	Refer to page 3.
	Hepatotoxicity	Instruct patient to inform physician of abdominal distress and skin color change.
	Protein and coagulation abnormalities	Counsel patient regarding importance of regular blood chemistry and coagulation studies. Report any bleeding problems.
	Acute necrotizing pancreatitis may be abrupt and fulminating	Instruct patient to report onset of abdominal tenderness or pain.
	Leukopenia, thrombocytopenia	Refer to page 4 and page 5.
	Central nervous system toxicity (confusion, lethargy, slurred speech)	Inform patient/family that symptoms may occur and should be reported to physician/nurse.

Drug	Side Effects	Nursing Actions
MELPHALAN **L-PHENYLALANINE** **ALKERAN(R)** **L-PAM**	Bone marrow depression, delayed nadir 5-30 days after therapy.	Refer to page 4 and page 5.
Alkylating agent: is a nitrogen mustard	Nausea if taken on an "empty" stomach.	Stress importance of taking medication after eating.
Storage: 2 mgm tablets, oral, 10 mgm vial, white powder. Room temperature. Diluent supplied as 3 different components. Dissolve Melphalan in 1.0 ml of acid-alcohol solvent and further dilute with 9.0 ml of phosphate buffer in this order. Reconstituted drug should be used within 15-20 minutes.	Oral mucosal ulceration	Refer to page 8.
	Amenorrhea	Alert patient to the possibility that menstrual period may cease during chemotherapy.
	Necrosis may occur at site of extravasation.	If extravasation occurs, inform physician. Infusion site should be closely observed for 24 hours.
Administer: Oral Intravenous (investigational)		

Drug	Side Effects	Nursing Actions
MAYTANSINE Isolated from plant species: *Maytennus serrata* and *buchanii*. Similar in action to vinca alkaloids, inhibits mitosis	Gastrointestinal distress: mild nausea and vomiting, diarrhea, abdominal cramps cramps	Refer to page 3.
	Bone marrow depression (minimal)	Refer to page 4 and page 5.
Storage: lypholized powder vial with 0.25 mgm Maytansine and 100 mgm Mannitol. Unreconstituted, store in refrigerator. Reconstitute with 5 ml water or sodium chloride; use in 8 hours.	Generalized weakness, numbness and tingling	Patients should be alert to signs of neurotoxicity, generalized weakness, disturbance of peripheral sensory weakness. Total side effects are ill-defined since this is an investigative agent. Patients should report any unusual side effects experienced.
Administer: Intravenously in normal saline or D_5W.		
Investigative agent	Possible pancreatitis	Stress importance of follow-up blood work; report abdominal pain or tenderness.
	Abnormal liver function	Stress importance of follow-up blood work; instruct patient to report change in color of skin or mucous membrane.
	Phlebitis, fibrosis and mild edema at injection site	Infuse drug slowly in D^5W or NS; rinse vein well. Instruct patient to report tenderness, swelling of I.V. site.

Drug	Side Effects	Nursing Actions
6 MERCAPTOPURINE (6MP), Purinethol Antimetabolite: purine antagonist	Increased potency of 6MP when patient is receiving Allopurinol	6MP dose should be reduced to no more than 1/3 while patient is receiving Allopurinol.
Storage: 50 mgm. tablets, 500 mgm vials. White powder. Room temperature; dilute with 10 ml. of water, dilute further to 1/2 mgm/ml. Discard solution not immediately used.	Bone marrow depression	Refer to page 4 and page 5.
	Anorexia, weight loss, nausea and vomiting	Refer to page 3.
	Stomatitis	Refer to page 8.
Administer: oral or I.V. (IV Investigational)	Hepatotoxicity (cholestatic jaundice reversible when drug discontinued)	Instruct patient in regard to importance of blood work (liver studies). Alert patient to report changes in color of skin and mucous membrane.
Precaution: Allopurinol potentiates 6MP; reduce 6MP dose by 1/3 when Allopurinol is administered.	I.V. administration: venous spasm, skin blisters, pain at injection site when concentrated solution administered through a small vein.	"Piggy back" drug to D^5W for remainder infusion. Administer future 6MP through a less concentrated solution.
	Skin blisters from 6MP infusion.	Apply ice to skin blisters for 10". Instruct patient to keep area clean and ulcers covered.
	Rash	Inform patient of possibility of rash and instruct patient to notify physician/nurse if rash occurs.

Drug	Side Effects	Nursing Actions
METHOTREXATE, (MTX), Amethopterin Antimetabolite: metabolic folic acid antagonist.	Toxicity depends upon the duration of exposure to the drug rather than peak level of drug achieved.	Administer MTX carefully over exact time ordered. Prompt administration of calcium leucovorin as ordered. Assist with careful monitoring of serum MTX levels.
Storage: 5, 50, 500 mgm and 1 gram vials, yellow powder or liquid; room temperature. Tablets: 2.5 mgm stable.	Folic acid antagonist	Instruct patient to avoid vitamins containing folic acid.
Administer: Oral, Intravenous, Intramuscular, Intracavitary, Intrathecal.	Alopecia	Refer to page 5 and page 6.
IV: dissolve in sterile water; administer in D^5W. Refrigerate for storage after dissolving in D^5W.	Oral and gastrointestinal mucositis followed by ulceration; may result in ulceration of entire gastrointestinal tract.	Refer to page 8.
IT: dissolve in Elliott's B solution; if patient is receiving both systemic and IT therapy, IT may take the place of a systemic dose.	Conjunctivitis	Assess ocular status daily. Suggest comfort measures and prevention of infection.
High Dose MTX: Investigational	Nephrotoxic at high doses	Increase urine volume, alkalinization of urine prior to, during and for 48 hours after administration. Report abnormalities of urinary excretion or abnormal laboratory results. Instruct patient to maintain large fluid intake after therapy. Maintain alkalinization of urine.
Excretion: Predominantly by the kidneys.		
Precautions: Alkalinization and hydration mandatory for High Dose MTX. Normal kidney function essential.		

Drug	Side Effects	Nursing Actions
METHOTREXATE, *continued*	Nausea and vomiting	Refer to page 3.
	Hepatotoxicity	Stress importance of follow-up blood work (liver studies). Instruct patient to report color change of skin and mucous membrane.
	Dermal sensitivity to sunlight	Instruct patient to request sunscreen medication.
	Arachnoiditis and CNS toxicity with IT administration.	Instruct patient to report headache, fever, drowsiness, muscle pain, twitching, cranial or peripheral neuropathies, altered mental state.
	Bone marrow depression	Refer to page 4 and page 5.

Drug	Side Effects	Nursing Actions
METHYL CCNU (1-(2 cholorethyl)-3(4-methyl-cyclophexyl) 1-nitrosourea, Semistine	Nausea and vomiting occurs within 2-6 hours after dose.	Refer to page 3.
Alkylating agent; has the ability to cross the blood brain barrier.	Bone marrow depression (May be delayed for 3-4 weeks after dose)	Refer to page 4 and page 5.
Storage: 10, 20, 50, 100, 200 mgm capsules; refrigerate; avoid moisture; stable at 4°C.	Pulmonary fibrosis	Instruct patient to report any shortness of breath to physician/nurse.
Administer: Oral; take on an empty stomach. Take no food or drink for next 4 hours.	Renal failure (long-term use)	Instruct patient to report ankle edema, decreased urinary output. Inform patient that renal failure can occur.

Drug	Side Effects	Nursing Actions
MITOTANE Orthopara—DDD O.P. DDD Lysodren Metabolism: by liver Excretion: by kidneys *Storage:* 500 mgm tablets. Room temperature Synthetic agent	Nausea and vomiting anorexia, diarrhea. Dermatitis CNS toxicity; lethargy, dizziness, tremors and somnolence. Visual disturbances. Hypoadrenalism alters steroid metabolism by adrenals.	Refer to page 3. Instruct patient to use sunscreen; maintain good hygiene and report signs of skin disturbance. Caution against tasks requiring extreme coordination and concentration. Reassure patient that these signs are drug related. Report increased sleepiness, lethargy to physician/nurse. May cause insufficiency with need for cortisone replacement. Patient should be aware of symptoms to be reported. Patients on cortisone replacement need medic-alert bracelet. Urine collections to measure 17-OH corticosteroids as needed by physician.

Drug	Side Effects	Nursing Actions
MITRAMYCIN (Mithracin) *Antibiotic:* Derived from *Streptomyces astroovlivaceus;* complexes with DNA preventing RNA transcription.	Facial flushing often precedes hemorrhagic diathesis, result of damage to vascular walls. Damage to platelets, decrease in coagulation factors, prothrombin prolonged.	Inform patient that this is a drug side effect and instruct patient to inform nurse when this symptom occurs. Refer to page 5.
Storage: 2.5 mgm vial white powder; stable at 4° C. Dissolve in 4.9 ml. Infuse in 50-1,000 ml D_5W slowly. Use immediately. *Administer;* Intravenous	Decrease in blood calcium and blood potassium levels.	Observe for evidence of calcium and potassium deficiency. Stress importance of follow-up blood work. Monitor laboratory values (as ordered) and correct imbalances.
	Bone marrow depression, prolonged	Refer to page 4 and page 5.
	Stomatitis	Refer to page 3.
	Tissue necrosis with extravasation	Assure patency of intravenous infusion. Instruct patient to inform therapist of discomfort at infusion site. If extravasation occurs, instruct patient in care of site.
	Nausea and vomiting (severe), diarrhea (increased with rapid, direct IV injection).	Refer to page 3.
	Hepatic and renal damage	Instruct patient to inform physician of changes in skin color, urinary discomfort, prolonged gastrointestinal disturbances. Stress importance of follow-up blood work.
	CNS depression (drowsiness, weakness headache, lethargy)	Instruct patient to inform physician/ nurse if any of these symptoms occur.

Drug	Side Effects	Nursing Actions
MITOMYCIN-C (MUTAMYCIN) *Antibiotic:* Isolated from *Streptomyces caespitosus.* Inhibits synthesis of DNA. *Storage:* 5 mgm vial powder. Dissolve in 10 ml. Saline. Stable at 4°C. *Administer:* Intravenous. Administer through a running IV.* *Not in common use due to toxicity	Bone marrow depression	Refer to page 4 and page 5.
	Nausea and vomiting	Refer to page 3.
	Fever, malaise, weakness	Inform patient that this is a temporary side effect. Fever for more than 24 hours should be reported to physician.
	Stomatitis	Refer to page 8.
	Tissue necrosis with extravasation	Refer to page 6 and page 7.
	Renal toxicity	Instruct patient to inform physician of any evidence of urinary distress. Stress importance of hydration and follow-up blood work.
	Alopecia	Refer to page 5 and page 6.

Drug	Side Effects	Nursing Actions
NITROGEN MUSTARD (HN^2) Mechlorethamine Mustargen Hydrochloride Alkylating agent *Storage:* 10 mgm vial, white powder; store at room temperature. *Reconstitution:* 10 ml water. Stable for 5 hours after mixing. Use gloves to prepare; protect skin and eyes. *Administer:* Intravenous thru running IV; Intracavitary. *Protect skin and eyes of person administering drug.* If contact occurs, area should be irrigated with large amounts of water for at least 15 minutes followed by a 2% sodium thiosulfate solution irrigation.	STRONG LOCAL IRRITANT	Instruct patient to report signs of swelling, pain, tenderness or redness at injection site.
	Local reaction/ phlebitis may occur at site of injection. Skin necrosis may occur at site of extravasation.	Instruct patient to apply ice pack *constantly* for 24 hours to infusion site. Instruct patient to exercise affected extremity and to report any pain, tenderness or discoloration in area to physician. Apply heat to area after 24 hours.
	Systemic absorption occurs from intra-cavitary injection.	Turn patient every 15 minutes for 1 hour to distribute dose.
	Bone marrow depression (nadir occurs 2-3 weeks after administration.)	Refer to page 4 and page 5.
	Alopecia	Refer to page 5 and page 6.
	Nausea and vomiting, diarrhea	Refer to page 3.
	Hepatotoxicity	Stress importance of follow-up blood work (liver chemistries). Instruct patient to report changes in color of skin or mucous membrane.
	Tinnitus and diminished hearing (uncommon; patients with noise exposure more prone)	Inform patient of possibility. Reassure patient that this side effect is reversible.
	Chills, fever	Instruct patient to document fever and report symptoms to physician/nurse.

Drug	Side Effects	Nursing Actions
PALA (N-Phosphono-acetyl-L-Aspartate) Antimetabolite: pyrimidine activity. *Storage:* Drug supplied in 10 ml vial. Aqueous solution; 100 mgm PALA/ml. Normal Saline is recommended diluent. *Administer:* Intravenously in a *30 minute infusion.* Do not "push". Investigational agent *Excretion:* in urine	Gastrointestinal: nausea, vomiting, mucosal ulceration, bloody diarrhea	Refer to page 3. Instruct patient to report bloody diarrhea immediately to physician.
	Central nervous system: lethargy, coma, seizures	Instruct patient to report any evidence of somnolence, lethargy, etc. to physician. Prepare room with emergency drugs, suction and oxygen before administration of drug.
	Hepatotoxicity	Instruct patient in importance of follow-up blood work (liver studies). Instruct patient to report changes in color of skin and mucous membranes.
	Renal toxicity	Inform patient of importance of follow-up blood work. Instruct patient to report changes in frequency and color of urinary excretion.
	Alopecia	Refer to page 5 and page 6.
	Skin toxicity (rash)	Instruct patient to report redness of skin, especially on the face (near mouth), in the groin and under the arms.
	Hyperglycemia	Monitor urine output for sugar/acetone. Instruct patient to report frequent voiding. Instruct patient to report blurred vision, headache, excessive thirst, warm skin.

Drug	Side Effects	Nursing Actions
PENTAMETHYL-MELAMINE NSC 118742 (PMN) Monodemethylated derivative of Hexamethylmelamine which is water soluble. *Storage:* White lypholized powder in 20 ml vials with 500 mgm of PMN, 300 mgm Mannitol and Sodium Hydroxide. Store intact vials at room temperature. Reconstitute with 9.5 ml sterile water for injection. Reconstituted vials should be used within 8 hours as the vial contains no bacterial preservatives. Dilute further in D_5N/S or D_5W. *Administer:* Intravenous (Investigational) Administer in 100 ml D_5N/S or D_5W over 1 hour.	Gastrointestinal: nausea and vomiting. Bone marrow depression (especially platelets). Neurological: parasthesias, ataxia, peripheral neuropathy, mental changes.	Refer to page 3. Refer to page 4 and page 5. Instruct patient to report sensations of tingling, disturbances in coordination, muscle control, or mood changes, to physician.

Drug	Side Effects	Nursing Actions
POLY (ICLC), Stabilized polyriboinosinic acid-polyribocytidylic acid complex. Effective inducer of interferon which results in significant resistance to replication of RNA & DNA viruses.	Pyrogenic response with maximum temperature elevations of approximately 3° has occurred 4-8 hours post-treatment.	Inform patient that febrile response is expected and that staff is prepared to assist patient. Inform patient that febrile response decreases with subsequent doses.
Storage: solution which contains 2 mgm/ml of Poly (I) poly (C) and 1.5 mgm/ml of poly-L-Lysine in 0.570 carboxymethyl cellulose. Stable in solution at 4°C and *should be refrigerated* but not frozen.	Hepatotoxicity	Instruct patient in importance of follow-up blood work (liver studies). Instruct patient to report changes in color of skin and mucous membranes.
Administer: Intravenous (Investigational) Infuse; do not "push". Administer in 50 ml of normal saline over a 60" period.	Renal toxicity	Inform patient of importance of follow-up blood work. Instruct patient to report changes in pattern, color of urinary excretion.

Drug	Side Effects	Nursing Actions
POLY (ICLC), *continued*	Nausea and vomiting.	Refer to page 3.
	Hypotension (may be dose-related)	Prepare patient's room with suction, oxygen and emergency drugs before infusion. Obtain baseline vital signs and monitor vital signs every 15" during infusion and for 1 hour after infusion. Inform patient that staff is prepared for this possible side effect. Instruct patient to immediately report change in status (e.g. breathing)
	Bone marrow depression	Refer to page 4 and page 5.
	Erythema	Instruct patient to report any changes in appearance of skin to physician/nurse.
	Arthralgia and myalgia	Inform patient that this is an expected side effect and that staff is prepared to assist patient with discomfort.

Drug	Side Effects	Nursing Actions
PROCARBAZINE (Methylhydrazine) (Matulane), (Natulan) Synthetic agent	Delayed bone marrow depression (may occur 2-5 weeks after therapy)	Refer to page 4 and page 5.
Storage: Store at room temperature 50 mgm capsules *Administer:* oral *Excreted:* in urine	Mental depression, mild CNS toxicity, lethargy, drowsiness, ataxia. Effect potentiated by concomitant use of CNS depressants (e.g. narcotics, barbiturates)	Instruct patient about neurological disturbances (e.g. parasthesia, numbness, loss of tendon reflex).
	Skin rash, fever (may be allergic reaction)	Instruct patient as to possibility of skin rash and inform patient to report rash and fever to physician.
	Nausea and vomiting	Refer to page 3.
	Orthostatic hypotension	Instruct patient as to proper manner of slowly rising to standing position.
	Monamine oxidase inhibitory activity; therefore, sympathomimetic drugs, antidepressant drugs and foods with high tyramine content should be avoided. Use caution with MAO inhibitors. Alcohol should be avoided as a disulfiram (Antabuse^{R}) like reaction may occur.	Instruct patient to avoid alcohol, certain drugs, ripe cheese, wine, cola, bananas, (avoid antidepressants and sympathomimetic drugs).
	Potent immunosuppressant	Refer to page 4.

Drug	Side Effects	Nursing Actions
STREPTOZOTOCIN, Broad spectrum antibiotic	Nausea, vomiting and abdominal cramps	Refer to page 3.
	Stomatitis	Refer to page 8.
Storage: Store in refrigerator 1.0 gm. vial. Mix with 9.3 ml water or saline. Stable for 2 days at 4°C. Unstable if mixed in fluid with pH>6.	Nephrotoxicity (albuminuria used to monitor toxicity)	Instruct patient to report symptoms of decreased urinary output, burning, frequency, hematuria. Instruct patient in use of equipment to measure albuminuria. Inform patient of necessity for blood chemistry and urinary follow-up. Dip-stick urine for protein before each treatment. Report protein 1+ or greater to physician.
Administer: Intravenously. Dilute in D_5W or normal saline, infuse over 30 minutes.		
Investigative agent	May cause hypoglycemia from sudden release of insulin, (due to lysis of pancreatic tumor cells)	Instruct patient to be alert to symptoms of hypoglycemia such as: sweating, flushing, pallor, trembling, chilliness, headache, dizzziness, weakness, hunger sensation, tingling of tongue and lips, visual disturbances.

Drug	Side Effects	Nursing Actions
STREPTOZOTOCIN, *continued*		Suggest that patient drink orange juice, eat candy, sugar, or honey to get quick relief. If symptoms do not go away promptly, notify the physician immediately.
		Suggest that patient wear a medic-alert braclet for "Hypoglycemia".
	Local pain or chill with infusion. (uncommon)	Slow infusion rate and/or apply local heat to prevent local pain.
	Hepatotoxicity	Stress importance of follow-up blood work (liver studies); instruct patient to report color changes of skin and mucous membrane.

Drug	Side Effects	Nursing Actions
TAMOXIFEN (TAM) Anti-estrogen. *Storage:* Tablets 2.5 mgm and 10 mgm. Store at room temperature.	Fluid retention	Patient should be aware of possible weight gain. Report signs such as dizziness, excessive weight gain, headache to physician.
Administer: Oral	Nausea and vomiting	Refer to page 3.
	Bone marrow depression	Refer to page 4 and page 5.
	Skin rash	Instruct patient about possibility of delayed skin rash.
	Hypercalcemia	Instruct patient to drink fluids (2000 ml/day) while receiving medication.
	Retinopathy	Alert patient to possibility of blurred vision and/or decreased visual acuity. Instruct patient to report symptoms to physician immediately. Suggest to physician pre-therapy ocular examination.
	Hot flashes, vaginal spotting, menstrual irregularities.	Inform patient that this can occur and instruct patient to report symptoms to physician/nurse.

Drug	Side Effects	Nursing Actions
6-THIOGUANINE (6-TG) Thioguanine Antimetabolite: blocks purine metabolism but is not affected by the concurrent administration of Allopurinol.	Nausea, vomiting, diarrhea	Refer to page 3.
	Bone marrow depression	Refer to page 4 and page 5.
	Hepatotoxicity	Inform patient of importance of blood work, (liver studies) Instruct patient to report changes in color of skin and/or mucous membranes.
Storage: Tablets: 40 mgm. Vials: 75 mgm/vial white powder, room temperature. Dilute with 5 ml. of water, discard after 24 hours.	Stomatitis	Refer to page 8.
	Skin rash, photosensitivity	Instruct patient to report changes in skin condition and to use a sunscreen.
Administer: Oral, I.V. (IV investigational)		
Metabolized: by liver.		
Excretion: in urine and feces		

Drug	Side Effects	Nursing Actions
THIOTEPA (Triethylene Thiophosphoramide) Alkylating agent *Storage:* 15 mgm. vials; stored in refrigerator. Reconstituted with 1.5 to 3.0 ml. of water; store in refrigerator. Reconstituted fluid should be clear to slightly opaque. Stable 5 days in refrigerator. *Administer:* Intravenous Intrathecal Intracavitary Incompatible with Elliott's B. *Intracavitary:* turn patient every 15 minutes for 1 hour to distribute dose.	Renal toxicity Bone marrow depression (delayed 5-30 days after dose) Nausea and vomiting, anorexia Headache and fever	Instruct patient that drug is excreted by kidneys; patient should assure hydration before, during and after chemotherapy. Refer to page 4 and page 5. Refer to page 3. Reassure patient that these are drug-related. Instruct patient to report symptoms to physician and to document fever.

Drug	Side Effects	Nursing Actions
VINBLASTINE (Velban) *Alkaloid:* Inhibits assembly of mitotic spindle thus stops mitosis in metaphase. *Storage:* 10 mgm vial, white powder. Refrigerate. Dissolve in 10 ml. sterile water. Stable 30 days at 4°C. *Administer:* Intravenous	Bone marrow depression	Refer to page 4 and page 5.
	Mild neurotoxicity	Instruct patient about possibility of neurological disturbances: paresthesias, numbness, loss of tendon reflex.
	Constipation, paralytic ileus	Recommend stool softener and report lack of stool within 3 days or abdominal discomfort to physician.
	Nausea and vomiting (rare)	Refer to page 3.
	Alopecia	Refer to page 5 and page 6.
	Tissue necrosis with extravasation.	Refer to page 6 and page 7.
	Photoxicity	Suggest use of sunscreen.

Drug	Side Effects	Nursing Actions
VINCRISTINE (Oncovin) (Vcr) *Alkaloid:* Inhibits assembly of mitotic spindle thus stops mitosis in metaphase. *Storage:* White powder, packaged in both 1 mgm and 5 mgm vials. Must be refrigerated. Dissolve in 10 ml saline; stable 14 days at 4°C. *Note:* Do not store Vcr in plastic syringes after preparation. *Administer:* Intravenous. Administer through a running infusion to avoid extravasation. Metabolism almost exclusively by liver.	Peripheral neuropathy: obstipation, ptosis of eyelids, weakened hand grasp, hand tremors, weakened foot muscles, double vision.	Instruct patient about possibility of neuromuscular toxicity: leg cramps, paresthesias, severe jaw pain. Emphasize the importance of early detection for dose modification and reversibility.
	Constipation if untreated may lead to paralytic ileus.	Suggest use of stool softener for constipation. Report absence of stool 3 days post therapy.
	Tissue necrosis at extravasation site.	Refer to page 6 and page 7.
	Alopecia	Refer to page 5 and page 6.
	Nausea and vomiting (rare)	Refer to page 3.
	Hepatotoxicity Dose reduction is necessary if hepatic metastasis impairs liver function severely.	Stress importance of follow-up blood work to monitor liver function. Instruct patient to report change in color of skin or mucous membrane.
	Mild bone marrow depression	Refer to page 4 and page 5.
	Mental depression (rare)	Inform patient of possibility. Instruct patient to report symptoms to physician/ nurse.
	Inappropriate ADH syndrome (hyponatremia)	Inform patient of need to monitor blood chemistry.

Drug	Side Effects	Nursing Actions
VM 26 (Thenylidene-Lignan P)	Nausea and vomiting	Refer to page 3.
	Bone marrow depression	Refer to page 4 and page 5.
(PTG) (Epidodophyllo-toxin) Dimethyl-Thenlidene-glucoside)	Alopecia	Refer to page 5 and page 6.
	Stomatitis	Refer to page 8.
Semisynthetic product derived from podophyllotoxin	Hypotension with rapid administration	Infuse over 45 minutes. Monitor patient's vital signs every 15 minutes during infusion and for 30 minutes afterward. Instruct patient to report dizziness, faintness. Instruct patient to move slowly for first few minutes after therapy (postural hypotension).
Storage: 50 mgm/5 ml ampules in solution. Store at room temperature. Dilute with 10-20 volumes of sodium chloride or D_5W. Solution is stable for 4 hours if diluted with 50-100 volumes of D_5W or N.S.		
Administer: Slow intravenous. Opalescence is due to surfactant in the drug.		
Investigative agent		

Drug	Side Effects	Nursing Actions
VP-16213 (EPEG) Epipodophyllotoxin Ethyledine glycoside Produces arrest of metaphase in cell division Semisynthetic product derived from podophyllotoxin *Storage:* Ampules 100 mgm/5 ml. in non-aqueous oil solution. Store at room temperature. Reconstituted drug use in 1 hour. *Administer:* In slow intravenous infusion over 1 hour. Dilute in 150-250 ml. of physiological saline *only*. NOTE: Direct IV push is contraindicated due to possible cardiac problems, hypotension, and bradycardia. *Investigative agent* Stability is dependent on dilution of drug: *Dilution* — *Time to Precipitation* 1:20 — 30 minutes 1:50 — 3 hours 1:100 — 6 hours	Bone marrow depression, primarily leukopenia which reaches nadir 10 days after dose is given Nausea, vomiting, diarrhea, stomach, abdominal cramps Alopecia Hypotension, bradycardia Radiation recall	Refer to page 4 and page 5. Refer to page 3. Refer to page 5 and page 6. Prepare emergency equipment and drugs. Inform patient that staff is prepared for this possibility. Vital signs are monitored every 15 minutes during infusion and for 1 hour afterward. Instruct patient to report dizziness, chest pain, or faintness. If bradycardia or hypotension develop, stop infusion. Infuse D_5W or NS. Inform physician. Observe patient until vital signs are stable, then resume infusion at a slower rate. Instruct patient to observe for redness or breakdown of skin in area of prior radiotherapy.

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